IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Phenyl-Thiocarbamide Tasting Ability Among Meos And Sunni Muslims Of Haryana

Dr Surender Singh
Associate Professor of Zoology
Govt College for Women Panchkula, Haryana

Abstract

Variations exist among human individuals as well as among groups of individuals at various levels. Study of such variations helps in revealing historical relationships among them, as also the impact of environment. Polymorphism of traits are now considered as the basis of differentiation using gene frequency data of a number of genetic loci. Among human beings inbreeding is usually uncommon because of social conventions and laws although in small isolated populations it does occur, mainly through mating between relatives. The most common type of close inbreeding is between first cousins. The effect is always an increase in frequency of genotypes that are homozygous for rare, usually, harmful recessive trait. The present investigation was planned on Meos and Sunni Muslims of Haryana because instances of close inbreeding were observed among them. P.T.C. tasting ability was studied by technique of Harris and Calamus (1949). Intercaste and bisexual differences were calculated by applying chi-square (χ^2) test to find out significance and distribution of these traits whereas sex differences were found to be significant both in Meos and Sunni Muslims for P.T.C. tasting ability.

Keywords: P.T.C. tasting, inbreeding, Haryana, Polymorphism.

Introduction

Some persons cannot perceive bitter taste of P.T.C. (Fox, 1932). Among tasters, different people have different levels of threshold i.e. the concentration at which one begin to perceive bitter taste or a taste different from drinking water. Thus, the taste sensitivity to P.T.C. shows polymorphism at population level. The ability to taste P.T.C. depends upon the level of di-iodo-tyrosine in saliva (Fischer et al., 1965). Some persons find the weak solutions of P.T.C. tasteless and strong solutions bitter. So, tasting ability is not definite, but the reaction of an individual is constant.

A working hypothesis that has been assumed to explain variable expressivity is that there is incomplete dominance of taster gene T with failure of penetrance in heterozygotes to certain extent (Das, 1958). The two alleles of the gene pair T and t coexist in a population showing balanced polymorphism. It is not possible to distinguish the genotypes TT and Tt in terms of manifestations. The inability to taste P.T.C. is inherited as a recessive trait but there is evidence that threshold value is higher in heterozygous tasters (Tt) than in homozygous tasters (TT).

Sanghvi and Khanolkar (1949) were the first to initiate P.T.C. studies in India. Complete information on the investigations carried out on P.T.C. tasting system in the diverse Indian populations has been compiled by Bhasin et al. (1992). However, no investigation has been done on Meos and Sunni Muslims in Haryana.

Materials and Methods

A random sample of 341 individuals was selected from Meos and Sunni Muslims of Haryana for P.T.C. tasting ability. The subjects were tested for the P.T.C. tasting ability. The modified sorting technique of Harris and Kalmus (1949) was used to ascertain the threshold of sensitivity to P.T.C. A stock solution of PTC was prepared by dissolving 0.13gm of crystals in 100ml of tap local water. The strength of the solution was reduced to half in each successive dilution. The serial dilutions were numbered 1 to 13 in the decreasing order of P.T.C. concentration. The 14^{th} solution was normal tap water. Using droppers, the subjects were made to taste a series of P.T.C. dilutions prepared from local tap water, starting from least concentrated solution. Every time before proceeding to the next solution, the subject was given little tap water to rinse his mouth to remove any remaining P.T.C. from the earlier solution. The subject was asked to tell whether he finds the solution different in taste (say, bitter or sour) from the normal tap water, and that solution (dilution) was recorded as his threshold in the proforma.

Results

Table 1 shows the percentage frequency distribution of taste thresholds among male and female subjects. The antimodal value was taken as separation point for the categorization of tasters and non-tasters. Table 2 presents the observed phenotype numbers and gene frequencies of P.T.C. tasting ability system in male and female subjects. Frequency of taster males in Meos was 59.09 % and in Sunni Muslims was 58.10%, whereas frequency of non-taster males in Meos was 40.91% and in Sunni Muslims was 41.90%. Frequency of taster females in Meos was 75.38% and in Sunni Muslims was 86.89%, whereas frequency of non-taster in Meos was 24.62% and in Sunni Muslims was 13.11% (Table 2). Percentage frequency of total number of tasters (males and females) was more in Sunni Muslims (68.67%) and less in Meos (65.14%) whereas percentage frequency of total number of non-taster individuals (males and females) was more in Meos (34.86%) and less in Sunni Muslims (31.33%). The phenotypic frequencies of phenyl thio-carbamide tasting ability were 0.651 in Meos and 0.687 in Sunni Muslims (Tables 13-14). The frequency of 'T' allele in male individuals was comparable in Meos (0.360) and

Sunni Muslims (0.353, Table 2). While in the case of female individuals, 'T' allele frequency was lower in Meos (0.504) and higher in Sunni Muslims (0.638). For total number of individuals (male and female combined), frequency of T allele was found more in Sunni Muslims (0.440) than in Meos (0.409). Bi-sexual differences were statistically significant both in Meos (χ^2=4.778, df=1, 0.05>P>0.02) and Sunni Muslims (χ^2=14.864, df=1,P<0.001). Intercaste differences were statistically non-significant (χ^2=0.287, df=1, 0.70>P>0.50) indicating homogeneous distribution.

Table 1: Percentage Frequency Distribution of Taste Thresholds for P.T.C. Tasting Ability in Meos and Sunni Muslims of Haryana

Population Group	Sex		P.T.C. Threshold number														Total No.
			<1	1	2	3	4	5	6	7	8	9	10	11	12	13	
Meo	M	No.	16	13	8	4	4	7	4	11	13	17	8	2	2	1	110
		%	14.55	11.82	7.27	3.64	3.64	6.36	3.64	10	11.82	15.45	7.27	1.82	1.82	0.91	
	F	No.	8	6	2	0	5	12	7	2	8	3	1	7	2	2	65
		%	12.31	9.23	3.08	0.00	7.69	18.46	10.77	3.08	12.31	4.62	1.54	10.77	3.08	3.08	
	M+F	No.	24	19	10	4	9	19	11	13	21	20	9	9	4	3	175
		%	13.71	10.86	5.71	2.29	5.14	10.86	6.29	7.43	12.00	11.43	5.4	5.14	2.29	1.71	
Sunni Muslim	M	No.	28	9	6	1	4	6	4	8	25	6	7	1	0	0	105
		%	26.67	8.57	5.71	0.95	3.81	5.71	3.81	7.62	23.81	5.71	6.67	0.95	0.00	0.00	
	F	No.	7	1	3	8	5	9	4	11	2	5	3	0	2	1	61
		%	11.48	1.64	4.92	13.12	8.20	14.75	6.56	18.03	3.20	8.20	4.92	0.00	3.28	1.64	

	M+F	No.	35	10	9	9	9	15	8	19	27	11	10	1	2	1	166
		%	21.08	6.02	5.42	5.42	5.42	9.04	4.82	11.45	16.27	6.63	6.02	0.60	1.21	0.60	

M=male, F=female

Table 2: Phenotypes and Gene Frequencies of Tasters and Non-tasters of P.T.C. in Meos and Sunni Muslims of Haryana

Population groups	Sex	Total Number	P.T.C. Phenotypes				P.T.C. gene frequencies	
			Tasters		Non tasters		T	t
			No.	%	No.	%		
Meo	M	110	65	59.09	45	40.91	0.360	0.640
	F	65	49	75.38	16	24.62	0.504	0.496
	M+F	175	114	65.14	61	34.86	0.410	0.590
Sunni Muslim	M	105	61	58.10	44	41.90	0.353	0.647
	F	61	53	86.89	8	13.11	0.638	0.362
	M+F	**166**	**114**	**68.67**	**52**	**31.33**	**0.440**	**0.560**

M=male, F=female

Discussion

The present investigation showed that frequency of 'T' allele was 0.410 in Meos and 0.440 in Sunni Muslims (Table 2). The range in north-west Indian populations is from 0.285-0.673 the upper extreme being represented in the Tibetans of North India (Sharma, 1967) and the lower extreme in the male Brahmins of Bilaspur district (Bhalla et al., 1978). Chakalis of Andhra were reported to have higher value of 'T' allele (0.684) than observed in north-west India (Sudhakar et al., 1992). Rajaka of Andhra showed lower value of 'T' allele (0.360, Parvatheesam and Babu, 1996), than observed in Meos and Sunni Muslim of Haryana Meos showed value of 'T' allele in concordance with Khatri (0.401) of Punjab (Mitter and Bansal, 1975) and Rajput (0.406) of Shimla (Bansal and Kaur, 1978) whereas the Sunni Muslims were reported to have value of 'T' allele close to Brahmin (0.444) of Kulu (Varma, 1969), Jat (0.436) of Punjab (Mitter and Bansal, 1975).

In recent years, multilocus and multiallele models have been proposed in which one locus is specific to PTC tasting ability and a second locus codes for general taste sensitivity (Drewnowski, 1990). The field of taste receptor molecular genetics has seen many recent advances. Adler et al. (2000) have characterized a large family (40 or more) of G-protein-coupled receptors (TAS2R) expressed in taste cells. Furthermore, they have described several clusters of genes for bitter taste receptors across the genome. Most of these genes are simultaneously expressed in bitter taste cells and result in bitter taste sensation (Adler et al., 2000). Genetic analysis of P.T.C. tasting shows a major locus for PTC taste ability on chromosome 7q and a secondary locus on chromosme 16p (Drayana et al., 2003).

Among the persons affected with nodular non-toxic goiter, a lower frequency of tasters has been found by Harris et al. (1949). However, in Japanese, who normally have a low frequency of non-tasters, and in South American Indians who are nearly all tasters, no significant association between goiter and tasting could be found, whereas in the Netherlands and in Israel, persons with endemic goiter have shown a lowered frequency of tasters. On the other hand, it was found that in patients with diffuse toxic goiter, frequency of tasters is much higher (Kitchin et al., 1959). Several investigations have suggested that being a non taster of P.T.C. might be a genetic marker for alcoholism (Pelchat and Danowski, 1992).

Terry (1950) found a highly significant difference in the proportion of non-tasters between diabetics and non-diabetics. Harris and Kalmus (1949) found that there is higher dominance of T in females than in males. In majority of series tested so far, there are more tasters among women than in men. Women can feel the bitter taste in lower concentrations of P.T.C. than men as they have lower average taste thresholds.

Acknowledgements

The author is sincerely grateful to the authorities of Kurukshetra University, Kurukshetra for providing laboratory facilities and to CSIR (New Delhi) for providing financial assistance

References

Adler, E., Hoon, M.A., Mueller, K.L., Chandrashekar, J., Ruba, N.J.P. and Zukes, C.S. 2000. A novel family of mammalian taste receptors. Cell. 100: 693-702.

Bhalla, V., Roy, S. and Bhatia, K. 1978. Genetic polymorphism in Cis-Himalayan populations. I. Distribution of genetic markers in the Hill Rajputs and the Brahmans of district Bilaspur (H.P.) Ind. Antrhopologist. 8: 49-53.

Bhasin, M.K. et al. 1974. c.f. Bhasin et al., 1992.

Das, S.R. 1958. Inheritance of the P.T.C. taste character in man: An analysis of 126 Rarhi Brahmin families of West Bengal. Ann. Hum. Genet. 22: 200-212.

Drayna, D., Coon, H. Kim, U.K., Elsner, T., Cromer, K., Otterud, B., Baird, L., Peiffer, A.P. and Leppert, M. 2003. Genetic analysis of a complex trait in the Utah Genetic Reference Project: A major locus for PTC taste ability on chromosome 7q and a secondary locus on chromosome 16q. Hum. Genet. 112: 567-572.

Drewnowski, A. 1990. Genetics of taste and smell. Genetic Variation and Nutrition: 194-208.

Fischer, R., Griffin, F. and Pasamanick, B. 1965. the perception of taste: some psycho-physiological, pathophysiological, pharmacological and clinical aspects. In : Psycho-pathology of perception, eds. P. Hock and J. Zubin. New York: London. 129-163.

Fox. A. 1932. The relationship between chemical constitution and taste. Proc. Nat. Acad. Sci. 18: 115-120.

Harris, H. and Kalmus, H. 1949. The measurement of taste sensitivity of phenylthiourea (PTC). Ann. Eugen. London. 15: 24-31.

Kitchin, F.D., Howel-Evans, W., Clarke, C.A., McConnell, R.B. and Sheppard, P.M. 1959. P.T.C. taste response and thyroid disease. Brit. Med. J. i: 1069-1074.

Mitter, N.S. and Bansal, I.J.S. 1975. The effect of some social habits on PTC-taste response in two endogamous groups. Ind. J. Phys. Antrhop. Hum. Genet. 1: 169-173.

Parvatheesam, C. and Babu, B.V. 1996. PTC taste senstivity and colour blindness in Rajaka caste group of Andhra Pradesh. Journal of Human Ecology. 7(1): 63-64.

Pelchat, M.L. and Danowski, S. 1992 A possible genetic association between PROP-tasting and alcoholism. Physiology & Behaviour. 51: 1261-1266.

Sanghvi, L.D. and Khanolkar, V.R. 1949. Data relating to seven genetical characters in six endogamous groups in Bombay. Ann. Eugen. 15: 52-64.

Sharma, J.C. 1967. Taste sensitivity to phenyl thio-carbamide among three Mongoloid populations of the Indian border. Acta Genet. Med. Gem. 14: 317-323.

Sudhakar, G., Babu, B.V. and Padma, V. 1992. Variation in tasting ability for PTC and colour blindness among Chakali and Andhra Caste. Journal of Human Ecology. 3(3): 237-238.

Terry, M.C. 1950. Taste-blindness and diabetes in the colored population of Jamaica, J. Hered. 41: 306-307.

Varma, A. 1969. c.f. Bhasin et al., 1992.